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**SUBSTITUTE SPECIFICATION**  
**(marked-up version)**

**CAN COMPRISING A FOIL SEAL**

CROSS-REFERENCE TO RELATED APPLICATION

[001] This application is a National Phase of International Application Serial No. PCT/EP2004/002596, filed March 12, 2004.

**FIELD OF THE INVENTION**

[002] The invention relates to a can comprising a membrane seal, in which a sealing membrane is sealed to a bead which is completely continuous in the top region of the can casing, in order, in the case of an excess pressure occurring in the interior of the can, to effectively counteract the resultant peeling forces on the contact surface of the membrane with the can casing.

**BACKGROUND OF THE INVENTION**

[003] Some cans are sealable again by means of a closure after they have been opened, while others, in particular disposal cans, are emptied after they have been opened and, depending on the material from which they are made, are disposed of as wastes. Cans are as a rule produced from cardboard, from plastic or from a thin sheet metal material.

[004] A membrane foil, as a rule comprising paper or comprising aluminium, is often used as sealing material for cans. There is a large number of known solutions for this purpose, only a few types of which are to be listed here. Frequently, a membrane foil in the form of a disc sealing the can opening and having a projecting collar is sealed onto the inner wall of the can by means of this collar in the region of the can opening. Thus, for example, EP 0 700 838 discloses a can having a conical can casing which opens slightly upwards in the top region and onto which a sealing membrane is sealed on the inside. The aim of EP 0 700 838 is firstly to replace conventional sheet metal lids by a membrane and secondly to depart from purely vertical sealing of the membrane to the inner wall of the can and the associated technical difficulty with the use of U-shaped preformed membranes in relation to tolerance-related diameter variations of the can.

[005] When pressure is exerted from the inside on the membrane, for example during filling of the can or during transport in an aircraft, a peeling force acts on the connection of the membrane foil with the flange. The connection therefore has to be relatively strong in order to be able to counteract the peeling force, which however in turn makes it more difficult to tear off the foil.

[006] While beads in the can casing have generally been used to date to prevent injury in the case of ring pull sheet metal lids, the prior art discloses only a few cans having a bead for other purposes, which however differ from the invention by having other objects and other measures. Thus, for example, FR 917 018 intends to ensure a fixed position for the membrane disc and, for this purpose, uses a bead as a stop for the membrane collar during sealing. GB 532 834 in turn intends to seal the can with a membrane disc. The inward-rolled can edge holds the disc edge resting on the horizontal bead part.

[007] Another type of cans having a bead and having a membrane seal is described in the document CH-A5-643.502. In the case of this known solution, the opening of the can is covered with a membrane which is sealed on a continuous flange produced by pressing flat the can casing material. Such a flange has a large number of disadvantages and therefore has not become established in practice at all: it is difficult to be produced and in fact can be produced only in a plurality of operations; it weakens the can casing material owing to the sharp bends; it prevents residue-free emptying of the can; it yields in a springy manner when the membrane is sealed on. In one embodiment, an additional bead is provided which serves for ensuring that the can lid is securely held in the can body in the closed position of said can lid, which is even more complicated with respect to production and requires even more material. This additional material requirement may appear slight in the case of an individual can but is important in the case of mass-produced articles, as such cans are. With regard to the strong competition in this area, every additional requirement, even a slight one, is a disadvantage which as far as possible should be avoided.

## SUMMARY OF THE INVENTION

[008] It is therefore the object of the invention to eliminate the stated disadvantages of the known prior art in the case of cans having membrane seals. The object is achieved, according to the invention, especially by the provision of a can which has, in the top region, just below the can edge, preferably at a distance of 1 to not more than 10 mm below the can edge, an inward-directed bead which runs over the entire can circumference and to the top of which a sealing membrane is sealed.

[009] In this context, the term "top" is to be understood as meaning that side of the bead which faces the can edge. "Bottom" of the bead is to be understood as meaning that side of the bead which faces the interior of the can.

[0010] Further developments and advantageous developments of the invention are described in the characterizing clauses of the dependent Claims.

[0011] The bead according to the invention has a sufficient axial extension and optionally can be produced - in a manner known per se - by rolling in a single operation. Moreover, it is scarcely springy when the sealing membrane, for example a membrane foil, is sealed on. This also makes the connection of the membrane foil sealing the can to the can casing more stable and nevertheless does not make it more difficult to tear open the membrane foil. As a result of the formation of the bead according to the invention as shown in Figures 1, 2 and 3b, the can can moreover be emptied virtually without leaving a residue, and the weakening of the can casing is minimal. As a result of the arrangement of the bead immediately or shortly below the can edge, the internal volume of the can is fully utilized up to the possible upper limit.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] The present invention relates to a can comprising a membrane seal which has, in the can casing, in the region of the can opening, preferably at a distance of 1 to 10 mm from the can edge, a bead which runs around the entire can circumference and is sealed with a sealing membrane, for example a membrane foil, in particular a tear-open foil, the top facing the can opening or

facing the can edge and the bottom of the bead facing the interior of the can - considered when the can is upright - running uniformly or alternately either horizontally or obliquely inwards. In principle any combination of horizontal and/or oblique bead top and bottom is within the scope of the present invention. However, it is preferable if at least the bottom of the bead is oblique in order to facilitate complete emptying of the can. The tight seal between closure membrane and can bead can be achieved by suitable measures, such as, for example, by adhesive bonding or heat sealing.

[0013] The invention makes it possible to seal the membrane foil, which may preferably consist of paper or aluminium, with the oblique or horizontal top of the bead, either with the aid of adhesive applied to this part - either freshly or, after cooling thereof, subsequently by heating - or to seal said membrane foil with the aid of a heat-seal layer applied to the foil. However, this also ensures better retention of the membrane foil to prevent unintentional removal (peeling off) of the foil from the bead from the inside, because only a part of the upward-directed, internal force is effected in the direction of raising of the adhesive surface.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further features, advantageous and details of the invention will now be explained in more detail with reference to the drawings. There:

[0015] Fig. 1 shows a first embodiment comprising fastening of the membrane foil to a semicircular bead and to the perpendicular part of the inner wall of the can with the collar of the membrane foil;

[0016] Fig. 2 shows a second embodiment comprising fastening of the membrane foil without a collar to a triangular bead which is arranged immediately below the upper can edge; and

[0017] Fig. 3a and b shows further embodiments of the bead according to the invention.

## DETAILED DESCRIPTION OF THE INVENTION

[0018] A can casing 1 shown in Fig. 1 has a roll 4 at the upper can edge 8. Slightly below the upper can edge 8, i.e. preferably at a distance of 1 to 10 mm from the can edge, an inward-facing, semicircular bead 3 is formed. On that side 3a of the bead 3 which faces the upper can edge 8, a membrane foil 5 which may have a tear-open tab known per se and not shown is sealed on 2 in a manner known per se. According to the invention, however, the membrane foil is at least partly sealed to the top of the bead, preferably both at the top of the bead and to the adjacent, linear part of the inner wall of the can.

[0019] According to a second embodiment as shown in Fig. 2, the can body 1 is provided with a triangular bead 3, the edges or transitions of which to the can casing are, however, preferably rounded. A membrane foil 5 is sealed 2 to that section 3a of the bead 3 which points towards the upper can edge 8. Because this section is oblique, the internal force acting on the membrane foil 5 and originating from the can pressure acts only partly as a peeling force. Thus, the metal foil 5 can offer a relatively large resistance to unintentional and undesired peeling off. The can casing 1 can moreover be closed with a lid 7 which is held in an interlocking manner at the upper can edge 8 by virtue of the fact that it grips over the can edge 8 and at least partly engages the bead 3, preferably with an edge bead 6.

[0020] In the case of beads according to the embodiments of Figures 3a and 3b, the peeling force acting on the sealed membrane as a result of the internal pressure of the can is even smaller than in the case of bead shapes according to Fig. 1 and Fig. 2, so that the resistance to peeling off of the membrane is even greater.

[0021] In addition, the embodiment according to Fig. 3b having an oblique bottom 3b of the bead 3 permits residue-free complete emptying of the can content. The curvature of the bead between the horizontal, linear top 3a - in the case of an upright can - and the oblique bottom 3b may be either angular or rounded. It is also possible for the oblique bottom 3b to be either linear or curved, the angle relative to the horizontal, linear part 3a of the bead 3 - in the

case of an upright can - being of minor importance and in any case any deviation of the bottom 3b from a horizontal path facilitating complete emptying of the can. The bead according to the invention may have, for example, an internal (axial) height of 50%, optionally about 100 to 150%, of its radial depth. However, it may also have a smaller internal height, in particular in the case of a horizontal top 3a of the bead 3 - in the case of an upright can - according to Figures 3 and 3b.

[0022] According to the invention, it is also ensured that the resistance which the connection has to offer to the peeling force is increased without it being necessary to apply a greater force for tearing open. Thus, an optimum for the solution of the two, partly contradictory technical requirements is provided.

[0023] According to the invention, the formation and use of a second bead, which is otherwise required in the case of cans of this type, is moreover superfluous. As a result, the quantitative change of the reduction of the number of beads becomes a qualitative measure: utilization of the single bead for achieving two different objects.

[0024] It is understandable that the measures according to the invention not only provide a simple and economical solution but also contribute to the elimination of tolerance problems and moreover make use of complicated tools superfluous.